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CONTRIBUTIONS FROM THE LABORATORY
OF THE
MARINE BIOLOGICAL ASSOCIATION OF SAN DIEGO

XXXIII

THIRD REPORT ON THE COPEPODA OF THE SAN DIEGO REGION

BY

CALVIN OLIN ESTERLY

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CALVIN OLIN ESTERLY.

The animals described in this paper were all taken with the "000" or "10" plankton nets at stations and depths which are given under "occurrence" after the description of each species. In most cases only one sex has been taken and where a description deals only with the male or female it may be understood that the other sex is unknown. The nets were open, unless otherwise stated.

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All the figures were drawn with the aid of a camera.

Family CALANIDAE.

Genus **Aetideopsis** Sars.

Aetideopsis, Sars (1903), p. 159, supp. pls. 4, 5.
Faroella, Wolfenden (1904), p. 117, figs. 26, 27, 28.

The genus resembles *Aetideus* Brady in that the rostrum is heavy, strong and bifurcate, and the sides of the last thoracic segment acutely produced. The main difference between the two genera is that in *Aetideopsis* the fourth and fifth segments of the thorax are separated at least by a distinct line. The posterior maxillipeds are more slender in *Aetideopsis* than in *Aetideus*.

Aetideopsis also resembles *Chiridius* Giesbrecht in the general form of the appendages, but *Chiridius* has a weakly developed rostrum and as in *Aetideus* the fourth and fifth thoracic segments are not visibly separated.

There are some points about the two species I have recorded as belonging to *Aetideopsis* Sars, in which they do not agree with the descriptions of Sars, but I can see no valid reason for not including the San Diego specimens in that genus.

Aetideopsis pacifica, n. sp.

Pl. 28, figs. 24, 25, 30; pl. 31, figs. 86, 103; pl. 32, fig. 113.

Adult female. The head is smoothly rounded and the rostrum is strong and heavily chitinised (pl. 28, figs. 24, 25). The prongs of the rostrum do not curve backward very much and are set close together at the base; they do not diverge much from the base (pl. 28, fig. 30).

The sides of the last thoracic segment are produced into sharp projections and the head is fused with the first thoracic segment; the fourth and fifth thoracic segments seem to be fused, though there is a very distinct line visible between them everywhere (pl. 28, fig. 24). This is shown better in fig. 31, which is of *A. divaricata.* The abdomen is 4-segmented and, with the furca, is between one-fourth and one-fifth as long as the cephalothorax; the first segment is longer than any of the others and the second segment is about as long as the third and fourth together.

The anterior antennae are 23-jointed and do not extend back to the end of the cephalothorax. The posterior antennae and mouth parts do not show any peculiarities, unless the slender form of the posterior maxillipeds, which is characteristic of the genus, is mentioned (pl. 32, fig. 113). The first foot (pl. 31, fig. 86), has a 3-jointed outer ramus, each joint with an outer marginal spine. The inner ramus of the second foot is 2-jointed; that of the third and fourth feet is 3-jointed. The teeth on the serrate bristle of the outer rami in the second to fourth pairs of feet are characteristically arranged (pl. 31, fig. 103).

Length: 3.18 mm.

Coloration: Opaque white in formalin.

Occurrence: Station 1252, tow at, and vertical from, 310 f., sounding 345 f., July 11, 1906; station 1303, tow at, and vertical from, 315 f., sounding 340 f., July 18, 1906.

Actideopsis divaricata, n. sp.

Pl. 28, figs. 27, 29, 31, 32; pl. 31, figs. 88, 102.

Adult female. This species closely resembles the preceding one, but is easily distinguished from it by the form of the head and rostrum (pl. 28, figs. 29, 32). The rostral prongs are very long and strong; they curve backward somewhat and are set far apart at the base, from which they diverge but little (pl. 28, fig. 32). The last thoracic segment is produced laterally into strong points (pl. 28, fig. 31). This species also shows the distinct line between the fourth and fifth thoracic segments (pl. 28, fig. 31). The abdomen is 4-segmented and, with the furca, is from one-fourth to one-fifth as long as the cephalothorax; the genital segment is as long as the next two together, and the third and fourth segments are of equal lengths (pl. 28, fig. 31).

The anterior antennae are 24-jointed and extend back to about the middle of the abdomen. The other cephalic appendages are not unusual; the posterior maxillipeds are much like those of *A. pacifica* (pl. 32, fig. 113). The first foot has a 3-jointed exopodite, each joint with an outer marginal spine (pl. 31, fig. 88). The inner ramus of the second foot is 1-jointed but there is some indication of a line of fusion between two joints; the inner rami of the third and fourth pairs are 3-jointed. The teeth on the terminal spines of the outer rami second to fourth pairs of feet are long and more closely apposed for the greater part of their length than in *A. pacifica* (pl. 31, figs. 102, 103).

Length: 3.36 mm.
Coloration: Opaque white in formalin.
Occurrence: On the same stations as *A. pacifica.*

Genus **Gaidius** Giesbrecht.

Gaidius tenuispinus Sars.

Pl. 28, fig. 26; pl. 29, fig. 64.

Chiridius tenuispinus, Sars (1900), p. 67, pl. 18; (1903), p. 30, pl. 18 (female).
Gaidius tenuispinus, Sars (1903), p. 162, pl. 18 and supp. pl. 6.

Adult male. Similar to *G. pungens* Giesbrecht but distinguished from it by the much longer and more slender spines on

the thorax (pl. 29, fig. 64). While the San Diego specimen does not agree in all respects with the description given by Sars (1903, pp. 30 and 162), there is no apparent reason for making a separate species. The fifth feet are exactly as shown by Sars (1903, supp. pl. 6). Sars gives the length of the male as about 2 mm.

Length: 3.10 mm.
Coloration: In formalin, transparent and without pigment.
Occurrence: One male, station 1249, tow at, and vertical from, 325 f., sounding 370 f., July 11, 1906.

According to v. Breemen (1908, p. 36), *Gaidius pungens* and *G. borealis* Wolfenden (1904, p. 11), are the same as *G. tenuispinus* Sars.

Genus **Gaetanus** Giesbrecht.

Gaetanus secundus n. sp.

Pl. 26, fig. 3; pl. 28, figs. 38, 43; pl. 30, figs. 73, 84.

Adult female. The spine on the head is long, and directed forward and slightly downward, and the rostrum is short and rounded (pl. 28, fig. 43). The spines on the sides of the last thoracic segment are long and extend beyond the middle of the genital segment (pl. 28, fig. 38).

The length of the cephalothorax from the tip of the cephalic spine to the tip of the thoracic spine is over five times the length of the abdomen, including the furca. The cephalothorax and abdomen are each 4-segmented; in the latter, the genital segment is markedly convex on the ventral side and twice as long as the second and third segments together, and twice as long as the anal segment (pl. 28, fig. 38).

The anterior antennae when removed from the body are 10.9 mm. long, thus being twice the length of the body. The posterior antennae and mouth parts are of the usual forms; the posterior maxilliped has the lamella on the first basal (pl. 30, fig. 84). The swimming feet do not show any marked peculiarities except that the first basal of the fourth pair has a row of heavy spines (pl. 30, fig. 73).

Immature male. The forms that I take to be the males of this species resemble the adult females in every way except that they

have a fifth pair of feet which are not fully formed. According to Farran (1908, p. 35), the presence of a fifth pair of feet in immature animals of this genus is no evidence that they are males; but I cannot see that this is the case, at least in the available material.

Length: Adult females, 5.2 mm.

Coloration: Red pigment is found in the body between the appendages, in the eye, mouth-parts and feet, distal half of anterior antennae, and in the intestine.

Occurrence: Station 1249, tow at, and vertical from, 325 f., sounding 370 f., July 11, 1906; station 1315, tow at, and vertical from, 320 f., sounding 330 f., July 19, 1906.

Gaetanus secundus resembles *G. unicornis* (Esterly, 1906, p. 57), rather closely, but is easily distinguished by the much greater length of the antennae and the character of the spines on the basals of the fourth feet.

Genus **Undeuchaeta** Giesbrecht.

Undeuchaeta bispinosa n. sp.

Pl. 26, fig. 4; pl. 29, figs. 48, 56.

Adult female. This species resembles *U. major* Giesbrecht, but the head is not crested (pl. 26, fig. 4), and the sides of the last thoracic segments end in acute angles, not in pointed processes. The genital segment is of nearly the same shape as in *U. major*, and has the hook-like appendage at the right of the orifice, but in addition there is a spine on the right side of the segment about midway between the anterior and posterior borders (pl. 29, fig. 56); there is a second and much shorter spine at the left of the orifice. The segment carries a group of heavy spines on the left side at the posterior border, and usually the second segment is similar in that regard. The anterior antennae are as long as the cephalothorax, and the other appendages are not noticeably different from those in *U. major* Giesbrecht.

Length: Averages 4.5 mm.

Coloration: Opaque and without pigment in formalin. During life there is a small amount of reddish pigment in the basals of the maxillipeds and feet and in the anterior part of the intestine.

Occurrence: Females are common in the deep hauls; for example, station 1134, vertical from 285 f., June 26, 1906.

Undeuchaeta incisa n. sp.

Pl. 27, figs. 12, 19; pl. 28, fig. 28; pl. 29, fig. 59.

Adult female. The head is crested and has a rather prominent rostrum (pl. 27, fig. 19). The last thoracic segment is rounded on the right side and produced on the left into a process which is notched at the end (pl. 28, fig. 28; pl. 29, fig. 59). The cephalothorax is a little over four times as long as the abdomen and furca (pl. 27, fig. 12). The genital segment is markedly protuberant ventrally; there is a lamellar process at the right of the orifice, and on the right of the segment about the middle there is a wing-like extension (pl. 28, fig. 28; pl. 29, fig. 59).

The cephalothorax and abdomen are 4-segmented. The genital segment is as long as the second and third together, the second about half as long as the third and the anal half as long as the second. The furcal rami are short, broader than long, and about as long as the anal segment.

The anterior antennae extend a little beyond the end of the body. The posterior antennae are of the usual shape and the inner ramus is half the length of the outer. The maxilla has the form characteristic of the genus; the outer ramus has eleven bristles and the three middle ones are considerably shorter than the others.

The outer ramus of the first foot is indistinctly 3-jointed, the suture between the first and second joints being indicated by a line; there are two outer marginal spines. The spines of the outer margin of the outer ramus of the first foot are much longer than in the second and third feet.

Length: 6.1 mm.

Coloration: The animals are without pigment.

Occurrence: Station 1252, tow at, and vertical from, 310 f., sounding 345 f., July 11, 1906; station 1270, tow at, and vertical from, 155 f., sounding 170 f., July 13, 1906; station 1303, tow at, and vertical from, 315 f., sounding 340 f., July 18, 1906.

Genus **Euchirella** Giesbrecht.

Euchirella simplex n. sp.

Pl. 26, fig. 10; pl. 29, figs. 50, 62.

Adult female. The head has a high and rather pointed crest (pl. 29, fig. 50), and the last thoracic segment is very broadly rounded at the sides. The head is produced below into a minute point (pl. 29, fig. 50), which can scarcely be called the rostrum.

The cephalothorax and abdomen are both 4-segmented, the abdomen with the furca is about one-sixth the length of the cephalothorax. The first abdominal segment is as long as the last three together but does not show any peculiarities. The furcal rami are widely divergent and as long as the anal segment. (Pl. 29, fig. 62).

The anterior antennae are 23-jointed and when folded back reach a little beyond the last thoracic segment. The posterior antenna has the outer ramus two and one-half times the length of the inner. The outer ramus of the maxilla has ten bristles, the inner ramus three large bristles; the second basal has three bristles of which two are very small, and the outer marginal lobe has seven.

The outer ramus of the first foot is 3-jointed with three spines on the outer margin. In the second foot the outer marginal spine of the second joint of the outer ramus is long and curved and reaches a little beyond the tip of the first outer marginal of the second joint. The first basals of the fourth feet are without the spines usually found in this genus, there being only the plumose bristle.

Length: 6.36 mm.

Coloration: The mouth-parts and region are a very deep red; the basal halves of the anterior antennae are light red, and the plumose bristles on the posterior antennae are orange. The first pair of feet are the color of the mouth-parts, while the thorax and remaining pairs of feet are light red.

Occurrence: Station 1303, tow at, and vertical from, 315 f., sounding 340 f., July 18, 1906.

Euchirella simplex differs from all other species in lacking the spines on the first basal of the fourth foot, but it approaches the genus so closely in other respects that I have not removed it. *E. curticauda* Giesbrecht is also cristate and non-rostrate.

Euchirella propria n. sp.

Pl. 27, figs. 14, 20,; pl. 30, figs. 67, 83; pl. 31, fig. 85.

Adult male. The head is uncrested and smoothly rounded, with a short, stout rostrum (pl. 27, figs. 14, 20). The cephalothorax is 4-segmented and three and one-half times as long as the abdomen with the furca. The abdominal segments are of about equal lengths except for the anal segment which is so short as to be almost invisible.

The first foot (pl. 31, fig. 85) has a 2-jointed outer ramus and the first joint is provided with two tiny spines. The fifth feet are of the usual structure (pl. 30, fig. 83), and the outer ramus of the right foot is about four and a half times as long as the greatest breadth of the second basal joint.

Length: 5.6 mm.

Coloration: The sides of the thorax, the abdomen, and mouth-parts are red.

Occurrence: Station 1315, tow at, and vertical from, 320 f., sounding 330 f., July 19, 1906; station 1318, tow at, and vertical from, 170 f., sounding 330 f., July 19, 1906; station 1342, tow at, and vertical from, 150 f., sounding 330 f., July 21, 1906.

This species was found in the collections with *E. curticauda, pulchra, simplex, galeata* and *rostrata,* but I can discover no other evidence for its being the male of an old species and have therefore placed it in a species by itself.

Euchirella rostrata Claus.

Pl. 29, fig. 52; pl. 30, fig. 66; pl. 32, fig. 116.

Euchaeta hessei (male), Brady (1883), p. 63, pl. 20, figs. 1-13; pl. 23, figs. 11-14.

Euchirella rostrata (male), Cleve (1900), p. 4, pl. 2, figs. 1-14.

Adult male. While the males resemble the females in the general form of the body, the presence of the fifth pair of feet will distinguish the former from the latter; these organs in *E. rostrata* are quite unlike those in any other species (pl. 32, fig. 116). Both feet are biramous; the inner ramus of the right foot is nearly twice as long as that of the left. The former is of a peculiar shape, being bent at the end so that a hooked process extends proximally. The outer ramus of the right foot is more

than four times as long as the second basal is wide. The outer ramus of the left foot terminates about as in the other species (pl. 30, fig. 66), but the third joint ends in a sharp point.

Length: 3 mm.

Coloration: The posterior half of the body is orange, there being no pigment anterior to the first pair of feet; there are flecks of coloring matter in the thoracic segments and basals of the feet.

Occurrence: Station 1140, vertical from 60 f., June 27, 1906; station 1177, vertical from 160 f., June 30, 1906; station 1134, vertical from 285 f., June 26, 1906.

Females are a good deal more common than males.

Euchirella truncata n. sp.

Pl. 26, fig. 5; pl. 28, fig. 35; pl. 29, fig. 63; pl. 30, fig. 71; pl. 31, fig. 104.

Adult female. The head is regularly rounded in profile, without a crest and with a rostrum (pl. 28, fig. 35) of characteristic shape. The last thoracic segment is very broadly rounded laterally (pl. 29, fig. 63), and almost square when seen from above. The abdomen is very short, being (with the furca), a little more than one-sixth the length of the cephalothorax. The cephalothorax and abdomen are each 4-segmented (pl. 26, fig. 5). The genital segment is longer than the last three (pl. 29, fig. 63), and the two middle segments are of about equal lengths; the anal segment is about three-fifths the length of the third. The furcal rami are about as broad as long, widely divergent and provided with four bristles richly plumose to their ends and of equal lengths.

The anterior antennae are 23-jointed and when folded back reach beyond the end of the furca. The posterior antennae are of the usual form and the inner ramus is half as long as the outer. The outer ramus of the maxilla has eleven long bristles, the inner ramus four large bristles and one small, and the second basal two large and one small; the outer marginal lobe has eight bristles.

The outer ramus of the first foot is 2-jointed (pl. 31, fig. 104), with three outer marginal bristles; the first basal of the fourth foot has one long heavy spine near the plumose bristle (pl. 30, fig. 71). In the second foot, the outer marginal spines of the

outer ramus are of about equal lengths, but the spine of the second joint does not reach the base of the first spine of the third joint.

Length: 6.6 mm.

Coloration: The intestinal contents are red, the first three thoracic segments are outlined in red and the last segment is entirely so. The furcal bristles are bluish red and highly iridescent; those of the posterior antennae are somewhat iridescent, and there are two plumose orange bristles at the base of the anterior antenna.

Occurrence: Station 1303, tow at, and vertical from, 315 f., sounding 340 f., July 18, 1906; station 1306, tow at, and vertical from, 150 f., July 18, 1906; station 1516-2, vertical from 250 f., June 30, 1908.

Genus **Euchaeta** Phillipi.

Euchaeta diegensis n. sp.

Pl. 28, fig. 37; pl. 29, figs. 49, 55; pl. 31, fig. 92.

Adult female. The rostrum is very long and curved and the frontal eminence is prominent, though it does not protrude very much (pl. 28, fig. 37). The abdomen and genital segment resembles *E. media* Giesbrecht, but the genital covexity and the protuberances about the orifice are different; the right side of the segment as seen in outline is more irregular, with a smaller knob-like protrusion near the posterior margin of the segment (pl. 29, figs. 49, 55).

The anterior antennae are about as long as the cephalothorax. The maxilla has eight bristles (one very minute) on the first lobe of the outer margin, one on the second lobe of the inner margin, two on the second basal and four on the fused second and third joints of the inner ramus.

In the outer ramus of the second foot, the middle spine of the outer margin reaches two-thirds of the distance from its base to the base of the third outer marginal spine (pl. 31, fig. 92); in *E. media* the spine is longer. The third outer marginal is half as long as the middle one (in *E. media* it is about one-third as long). The outer marginal of the second joint is twice as long as the first of the third joint.

Length: 4.22 mm.

Coloration: Translucent and without pigment.

Occurrence: Station 1140, vertical from 60 f., June 27, 1906.

While this species resembles *E. media* Giesbrecht in some respects, the shape of the rostrum, the bristling of the maxilla, and the outer ramus of the second foot separate the two sharply.

Euchaeta acuta var. **pacifica** n. var.

Pl. 32, fig. 115.

Euchaeta acuta, Giesbrecht. (Esterly, 1905, p. 157, fig. 23).

Adult male. The fifth feet closely resemble those of *E. acuta,* as shown by Giesbrecht (1892, pl. 16, figs. 18, 19), but the process on the second joint of the outer ramus of the left foot is not pyramidal and pointed, and in addition the inner ramus of the right foot is broadened at the distal end and carries a flap-like appendage (pl. 32, fig. 115). There are no other noticeable differences, yet the process mentioned is usually a well-marked character in the differentiation of species. So it seems as if the San Diego form should at least be made a variety.

Occurrence: Station 1099, vertical from 35 f., June 20, 1906.

Euchaeta solida n. sp.

Pl. 26, fig. 2; pl. 28, fig. 34; pl. 30, fig. 78.

Adult male. The shape of the body is shown in fig. 2; the rostrum is heavy and straight, and pointed directly down (pl. 28, fig. 34); the frontal protuberance is not very marked.

The main point about the species is the shape of the toothed process on the second joint of the outer ramus of the left fifth foot; it is scoop-like and expanded distally (pl. 30, fig. 78).

Length: 5.22 mm.

Coloration: Somewhat opaque and whitish in formalin.

Occurrence: Station 1315, tow at, and vertical from, 320 f., sounding 330 f., July 19, 1906.

This species occurred with females of *E. spinosa, tonsa* and *diegensis,* but it does not seem to me that that alone is evidence enough to ally it with one of them.

Genus **Xanthocalanus** Giesbrecht.

Xanthocalanus tectus n. sp.

Pl. 28, fig. 33; pl. 29, fig. 53; pl. 31, fig. 95.

Adult female. The head is smoothly rounded but with a very slight crest (pl. 28, fig. 33), and the forehead protrudes

so that the rostral filaments are covered. The filaments are delicate, not situated on a prominence, and widely separated at the base. The last thoracic segment ends in a small, pointed projection (pl. 29, fig. 53). The cephalothorax is 4-segmented, the head being fused with the first thoracic segment. The abdomen is 4-segmented; the genital segment is as long as the second and third together and the anal is very short (pl. 29, fig. 53).

The anterior antennae are 24-jointed and from one-fifth to one-sixth of their length longer than the body. The outer ramus of the posterior antennae is one and one-half times the length of the inner ramus. The anterior maxillipeds have eight vermiform appendages. The first four pairs of feet are of the usual form; the second joint of the inner ramus in the second, third and fourth pairs has a proximal row of three or four long spines and a few short ones, and a distal row of from three to five short spines; the joints of the outer rami are not spinose on the flat surfaces. The fifth foot (pl. 31, fig. 95), is 3-jointed, the terminal joint with four heavy spines, two of which are on the distal margin of the foot.

Length: 4.25 mm.

Coloration: Whitish and translucent in formalin.

Occurrence: Station 1468, vertical from 290 f., sounding 330 f., June 19, 1908.

Xanthocalanus pulcher n. sp.

Pl. 29, figs. 60, 61; pl. 31, fig. 91.

Adult female. The head has a long, low crest, and the rostrum consists of two slender filaments (pl. 29, fig. 61). The last thoracic segment ends laterally in a small, sharp projection (pl. 29, fig. 60). The genital segment of the abdomen (pl. 29, fig. 61), has a slight ventral convexity, and the segment is as long as the third and fourth together; the second and third segments are of equal lengths, and the fourth is the shortest of all.

The anterior antennae are 23-jointed and as long as the cephalothorax. The maxilla has nine bristles on the outer ramus, five on the second basal, eight on the inner ramus and four on the second lobe of the inner margin. The anterior maxillipeds have six vermiform and two pencillate appendages.

The first foot has a 3-jointed outer ramus, the first joint without a spine on the outer margin. None of the feet are heavily spinose on the faces; the largest spines are on the inner ramus of the second foot and there are none at all on the fourth foot. The fifth foot (pl. 31, fig. 91), is 3-jointed, broader at the distal end than at the proximal, and with three spines on the terminal joint.

Length: 3.42 mm.

Coloration: Translucent, with orange pigment in the basals of the feet, in the mouth-parts, anterior antennae and abdomen.

Occurrence: Station 1134, vertical from 285 f., June 26, 1906.

The structure of the fifth feet and the presence of a crest are distinctive characters for this species.

Genus **Onchocalanus** Sars.

I refer the following species to the above genus on account of the resemblance of the anterior maxilliped to *Xanthocalanus* (*Onchocalanus*) *similis* (Esterly, 1906, p. 69, pl. 12, fig. 60). *X. similis* closely resembles *X. cristatus* Wolfenden, and that species is transferred to the genus *Onchocalanus* by Farran (1908, p. 49). I found no trace of a fifth pair of feet in my specimen but that was through multilation in dissecting.

Onchocalanus latus n. sp.

Pl. 29, fig. 47; pl. 30, fig. 70; pl. 31, fig. 97.

Adult female. The body is rather strongly depressed. The head is rounded both in dorsal and side views and the last thoracic segment is rounded at the sides. The cephalothorax is widest just behind the suture between the head and thorax (pl. 29, fig. 47). The abdomen is 4-segmented; the genital segment is about twice as long as the second, which is as long as the third; the anal segment is about one-third as long as the preceding one.

The anterior antennae are as long as the cephalothorax and 24-jointed. The inner ramus of the posterior antenna reaches about to the distal end of the second basal of the latter. The anterior maxilliped has one vermiform and six pencillate appendages; of the latter, four are slender and two very heavy (pl. 30, fig. 70).

The outer rami of all the feet are 3-jointed and in the first foot each joint has a spine on the outer margin. The outer rami are not spinose on the surfaces, but in the third and fourth feet the second joint of the inner ramus has groups or rows of heavy spines (pl. 6, fig. 97).

Length: About 4 mm.
Coloration: Translucent and unpigmented.
Occurrence: Station 1134, vertical from 285 f., June 26, 1906.

Genus **Scolecithrix** Brady.

Several species of Copepoda are found in the San Diego region which differ in important respects; these forms would belong to a number of different genera if one were to follow the classification of Sars or of Wolfenden. But as I stated in another paper (Esterly, 1906, p. 64), it does not seem to me that the separation of the large genus *Scolecithrix* into other well-defined genera is possible; at least, I find it difficult to do so with the San Diego forms. So I shall describe these specimens under the genus *Scolecithrix,* even if it should be found desirable later to change the classification.

Scolecithrix vorax n. sp.

Pl. 27, figs. 15, 21; pl. 29, fig. 45; pl. 30, fig. 68; pl. 31, figs. 93, 96, 99.

Adult female. The head is smoothly rounded and the rostrum is bifid, the prongs being stout, long and somewhat divergent (pl. 27, fig. 15). The last segment of the thorax is rounded and the margin is indented above and below the middle (pl. 29, fig. 45). The cephalothorax is 5-segmented and six and one-half times as long as the abdomen and furca; the abdomen is 4-segmented, the genital segment being more than twice the length of the others together; the second and third are of equal lengths and the anal is longer than the preceding one (pl. 27, fig. 21; pl. 29, fig. 45).

The anterior antennae are 23-jointed and, as carried on the body, do not reach back to the first segment of the thorax. The outer ramus of the posterior antenna is one and one-half times as long as the inner ramus and the bristles are very long and richly plumose. The anterior maxilliped has eight of the appendages so characteristic of the genus; but some of them are of a type

that is new so far as I am aware. Three are vermiform, four end in daisy-like expansions, and the other one is relatively of enormous size and terminates in a set of structures like tentacles (pl. 30, fig. 68). There is a central core in the larger appendage (not shown in the figure) that is surrounded by the tentacles. The four smaller flower-like appendages seem to have a similar structure.

The first foot has a 3-jointed outer ramus with three outer marginal spines, and a 1-jointed inner ramus. The inner ramus of the second foot is 2-jointed, that of the third and fourth feet is 3-jointed (pl. 31, fig. 93); the posterior surfaces of the rami are covered with spines of various sizes. The terminal spines of the three posterior pairs of feet are somewhat peculiar in having a row of small holes inside the serrated margin, as shown in plate 31, fig. 99. The fifth feet (pl. 31, fig. 96), are 2-jointed, the end joint with two heavy spines of which the outer one is the shorter.

Length: 1.6 mm.

Coloration: A brownish pigment is generally distributed through the body.

Occurrence: Station 1252, tow at, and vertical from, 310 f., sounding 345 f., July 11, 1906.

This species is distinct in the shape of the head and thorax, and in the character of the appendages of the anterior maxilliped.

Scolecithrix angusta n. sp.

Pl. 28, fig. 42; pl. 29, figs. 46, 51; pl. 31, fig. 101.

Adult female. The head has a long, low crest, and the rostrum is heavy and stiff; it is somewhat peculiar in the abruptness with which the slender terminal part originates from the heavier basal part (pl. 29, fig. 51). The cephalothorax is 5-segmented, the fourth and fifth segments being separated from each other; the last segment ends in a point and below this is a deep notch (pl. 29, fig. 46). The abdomen is 4-segmented and with the furca is about one-fifth the length of the cephalothorax (pl. 28, fig. 42); the genital segment is as long as the second and third together (these are of equal lengths) and about four times as long as the anal segment (pl. 28, fig. 46).

The anterior antennae reach back to the posterior border of the genital segment; the anterior maxillipeds have eight vermiform sensory appendages. The fifth feet are phyllous, 2-jointed, and the distal joint has three spines (pl. 31, fig. 101).

Length: 3.14 mm.

Coloration: Opaque white in formalin.

Occurrence: Station 1527, vertical from 500 f., sounding 640 f., July 11, 1908.

The shape of the head and thorax will serve to distinguish this species sharply from others.

Family CENTROPAGIDAE.

Genus **Pleuromamma** Giesbrecht.

Pleuromamma quadrungulata Dahl.

Pl. 30, fig. 65; pl. 32, fig. 111.

Pleuromma quadrungulata, Dahl (1893), p. 105.
Pleuromamma quadrungulata, Giesbrecht (1898), p. 109.

Those forms occur in the same hauls with *P. abdominalis* and *P. xiphias* commonly, and occasionally with *P. gracilis.* They are easily recognized by the four heavy, curved hooks on the anterior antennae (pl. 30, fig. 65). There are two hooks on the first joint, one on the second and one on the fourth; in *P. abdominalis* there is but one hooked spine and that is on the basal joint. The pigment knob in *P. quadrungulata* seems to be always on the right side. The sexes are alike in the spines of the anterior antennae, and the abdomen of the male is symmetrical. The fifth feet of the male are shown in pl. 32, fig. 111.

Length: Female, 3.48 mm.; male, 3.55 mm.

Coloration: Whitish in formalin, with a characteristic pink fleck in the mouth.

Occurrence: Rather common in all the deeper hauls, as station 1528, vertical from 500 f., sounding 640 f., July 2, 1908; none taken above 170 f.

Genus **Augaptilus** Giesbrecht.

Augaptilus lamellifer n. sp.

Pl. 26, fig. 8; pl. 28, fig. 36.

Adult female. The head and last thoracic segments are rounded (pl. 26, fig. 8); the rostral filaments are slender but

rather stiff and carried on a projecting lamella that can be seen from the side (pl. 28, fig. 36).

The cephalothorax is about three times as long as the abdomen and furca; the genital segment is somewhat longer than the second and third segments together, and the furca is as long as the genital segment and half the second one; the third segment is half as long as the genital (pl. 26, fig. 8).

The anterior antennae exceed the length of the body by their four terminal joints. The posterior maxilliped is very long and slender, the two basal joints being just one-fourth the length of the body. The other appendages do not show any noteworthy characters.

Length: 4.4 mm.
Coloration: Semi-transparent and without pigment.
Occurrence: Station 1252, tow at 310 f., sounding 345 f., July 11, 1906.

The appearance of the head and rostrum of this species is distinctive.

Genus **Disseta** Giesbrecht.

Disseta, Giesbrecht (1892), p. 63, 369; (1898), p. 112.
Disseta, Esterly (1906), p. 71.

Disseta maxima n. sp.

Pl. 29, figs. 54, 58; pl. 30, fig. 79.

Adult female. This species resembles *D. grandis* (Esterly, 1906, p. 71), but is larger. The head (pl. 29, fig. 54), is smoothly rounded, as is the last thoracic segment (pl. 29, fig. 58). The abdomen is 4-segmented; the genital segment is as long as the other three together, and the anal segment is less than one-third the length of the genital; the genital eminence is at the middle of the segment (pl. 29, fig. 58). The left furcal blade is longer than the right by about one-third the length of the latter.

The anterior antennae are very long and slender, one-fifth of their length longer than the body. The fifth feet (pl. 30, fig. 79) are of the usual form, but the spine of the second joint of the outer ramus is unusually long and heavy. It is nearly two-thirds the length of the third joint of the ramus, and from its

position on the joint reaches nearly to the distal margin of the third joint.

Length: 9.4 mm.
Coloration: Whitish and translucent in formalin, but unpigmented.
Occurrence: Station 1075, vertical from 600 f., Dec. 17, 1905.

Disseta sp. (Wolfenden).

Pl. 28, figs. 40, 41; pl. 30, figs. 76, 80; pl. 31, fig. 100; pl. 32, figs. 107, 108.

Heterorhabdus grandis, Wolfenden (1904), p. 120, pl. 9, fig. 36.
?Disseta palumboi Giesbrecht, (Farran, 1908, p. 67).

The figures given by van Breemen (1898, p. 228, fig. 243) of the fifth feet of the male of *Heterorhabdus grandis* Wolfenden agree closely with those of a species of *Disseta* found in this region. Farran (1908, p. 67), states that *H. grandis* Wolfenden is identical with *D. palumboi* Giesbrecht. However, so far as I am aware, the male of *Disseta* was unknown until I described the male of *D. grandis* (Esterly, 1906, p. 71), and I can see no reason for identifying *Heterorhabdus grandis* with *Disseta palumboi* in view of the few figures of the former that have been published. The length of *D. palumboi* is given as 5.7 mm., that of *H. grandis* as 6.6 mm., while the length of the specimens under discussion is 7.3 mm. In *D. grandis* Esterly the males are smaller than the females. The following is a description of the male from the San Diego region.

Adult male. The head, as seen in side view, ends in a rather abrupt angle, as do the edges of the last thoracic segment (pl. 28, fig. 40). The rostral filaments are stiff and placed so far beneath the head that they are invisible except from directly below; the sides of the cephalothorax in front seem to be prolonged so as to cover the rostrum (pl. 28, fig. 41).

The cephalothorax and abdomen are each 5-segmented and the former is twice the length of the abdomen and furca. The head is not fused with the thorax but the last two thoracic segments are fused with each other. The middle segment of the abdomen is the longest one; the first and second are of equal lengths and about four-fifths as long as the third; the fourth is three-fourths the length of the third, and the fifth is about

half as long as the third. The left blade of the furca is longer than the right.

The anterior antennae are 22-jointed and a little longer than the body; the grasping antenna is on the left side and the portion distal to the geniculation is 4-jointed. The terminal joint of the inner ramus of the second and third feet has eight bristles. The fifth feet are characteristic and shown in pl. 32, figs. 107, 108; the inner ramus of the left foot is 2-jointed.

Length: 7.3 mm.

Coloration: Whitish and transparent in formalin.

Occurrence: Station 1527, vertical from 600 f., sounding 640 f., July 2, 1908.

Genus **Augaptilus** Giesbrecht.

Augaptilus macrodus n. sp.

Pl. 27, fig. 18; pl. 29, fig. 44; pl. 30, figs. 72, 74; pl. 31, fig. 87; pl. 32, fig. 112.

Adult female. The body is exceedingly robust and the rostrum very long and heavy; the head is smoothly rounded, and the last thoracic segment (pl. 29, fig. 44) shows a peculiar indentation or bay in the posterior border. The cephalothorax is densely covered with fine spines; it is 5-segmented, the head being separated from the thorax; the head is a little longer than the rest of the cephalothorax (pl. 27, fig. 18). The abdomen is 3-segmented and, with the furca, is between one-fourth and one-fifth as long as the cephalothorax; the genital segment is about as long as the second and third together, the second half as long as the third and the furcal blades half as long as the abdominal segments (pl. 29, fig. 44).

The anterior antennae reach only to the posterior border of the head. The outer ramus of the posterior antennae is longer than the inner ramus and twice the greatest breadth of the second basal (pl. 30, fig. 72). The blade of the mandible is shown in fig. 74; it has three teeth, two of which are long and curved, the other being shorter and straighter. The bristles of the maxillipeds have the cup-like structure of this genus.

The rami of the feet are 3-jointed, but the third joint of the inner ramus of the third pair has eight bristles instead of six as

in that joint of the first, second and fourth pairs. The first pair is shown in pl. 31, fig. 87, and the outer ramus of the fifth pair in pl. 32, fig. 112.

Length: 5.31 mm.

Coloration: There is a characteristic brown fleck around the mouth; otherwise the body is exceedingly transparent.

Occurrence: Station 1249, tow at, and vertical from, 325 f., sounding 370 f., July 11, 1906.

The shape of the body in this species is characteristic so far as it is possible to compare it with figures of other species. The presence of eight bristles on the terminal joint of the inner ramus seems not to have been mentioned for other species.

Augaptilus lucidus n. sp.

Pl. 26, fig. 7; pl. 27, fig. 16; pl. 30, figs. 75, 77; pl. 32, fig. 105.

Adult male. The body is robust but the head is not so rounded as in the preceding species, and the rostral prongs are of a different shape, though heavy and stiff and expanded at the base (cf. pl. 27, figs. 16 and 18). The cephalothorax is 5-segmented and three and three-fourths times the length of the abdomen and furca; its greatest width is at a point midway between the anterior and posterior borders (pl. 26, fig. 7). The cephalothorax is densely covered with fine spines. The abdomen is 5-segmented; the genital segment is a little longer than the anal, the three middle segments are of equal lengths, and their combined length is that of the first segment. The furcal blades are as long as the fourth and fifth segments of the abdomen together (pl. 26, fig. 7).

The anterior antennae reach a little beyond the posterior border of the first thoracic segment (pl. 26, fig. 7). The rami of the posterior antennae are of equal lengths (pl. 30, fig. 77); the basal joint of the inner ramus is over half as broad as it is long. The blade of the mandible is shown in pl. 30, fig. 75; it is of the same structure as in *A. macrodus*, but the proportions are different. Both rami of all the feet are 3-jointed, but the end joint of the inner ramus of the third pair has eight bristles, while that joint in the other pairs (except the fifth) has six bristles. The fifth feet are not unusual (pl. 32, fig. 105).

Length: 5.81 mm.

Coloration: Very transparent, with a brown spot around the mouth.

Occurrence: Station 1339, vertical from 310 f., sounding 330 f., July 21, 1906.

This species appears to resemble *A. rattrayi* Scott, in the shape of the head; but the differences seem to me to be specific.

Augaptilus pyramidalis n. sp.

Pl. 26, figs. 1, 9; pl. 30, fig. 69; pl. 32, fig. 106.

Adult female. As seen from above the forehead is smoothly but rather sharply rounded (pl. 26, fig. 1); in side view the forehead is pyramidal in shape and overhangs the rostrum, which is very strong and heavy (pl. 26, fig. 9). The posterior margins of the thorax are rounded (pl. 26, fig. 9). The cephalothorax is 5-segmented and the abdomen 3-segmented; the former is six and one-half times as long as the latter with the furca. The head is as long as the thorax plus the abdomen and furca (pl. 26, fig. 9). The genital segment is as long as the rest of the abdomen and furca.

The anterior antennae reach to the posterior border of the second segment of the thorax. The rami of the posterior antennae are of equal lengths; the mandibular blade is of a similar structure to that in *A. macrodus*. The bristles of the maxillipeds are well equipped with augaptiloid cups.

The rami of the first pair of feet are 2-jointed and the first joint of the outer ramus has an unusually long and heavy spine (pl. 30, fig. 69); the rami of the other pairs of feet are 3-jointed and the end joints of the inner rami have 7, 8, 8, 7, 6 bristles in the five pairs respectively.

Length: 6.68 mm.

Coloration: Very transparent and without pigment.

Occurrence: Station 1557, tow with closing net at 250 f., July 17, 1908.

The shape of the head in this species recalls that of *A. horridus* Farran (1908, p. 78, pl. 8, fig. 29), but the head protrudes more in *A. pyramidalis* and the rostrum is heavier and longer. It is interesting to note that both the species mentioned lack the brown spot around the mouth, though that is a common feature of the larger transparent forms like those described here.

Genus **Paraugaptilus** Wolfenden.

Paraugaptilus buchani Wolfenden.

Pl. 26, fig. 6; pl. 28, fig. 39; pl. 29, fig. 57; pl. 31, figs. 94, 98.

Paraugaptilus buchani, Wolfenden (1904), p. 123, pl. 9, figs. 44, 45.
Arietellus buchani, Sars (1907), p. 26.
Paraugaptilus buchani, Farran (1908), p. 82.

Adult female. The specimens that I have agree fully with Wolfenden's description. His statement that the genus "seems to partake of some of the characters" of both *Arietellus* and *Augaptilus* seems to be correct. Sars (1907, p. 26) has transferred the forms to *Arietellus,* but it is hard to see how they can properly belong to that genus when they have the characteristic appendages of *Augaptilus* on the bristles of the maxillipeds. The fifth feet (pl. 31, fig. 94) are a good deal like those of *Arietellus* and not at all as in *Augaptilus.*

The animals are easily recognized by the lemon-yellow color when alive; it is found in the feet, the last two thoracic segments, the abdomen and mouth-parts, and in the last two joints of the anterior antenna. Another noticeable feature is the enlargement, or clubbing, of the end joint of the antenna (pl. 31, fig. 98). Other characteristic marks are shown in the figures.

Length: 3.63 mm.

Coloration: Lemon-yellow as described.

Occurrence: Station 1303, tow at, and vertical from, 315 f., sounding 340 f., July 18, 1906; station 1315, tow at, and vertical from, 320 f., sounding 330 f., July 19, 1906.

Genus **Arietellus** Giesbrecht.

Arietellus setosus Giesbrecht.

Pl. 27, figs. 22, 23; pl. 30, figs. 81, 82.

Arietellus setosus, Giesbrecht (1892), p. 415, pl. 29, figs. 1, 3-7, 9-13; pl. 39, figs. 34-36; 1898, p. 124.

Adult male. The female has been recorded previously from this region (Esterly, 1905, p. 189). The male resembles the female in the form of the body, but the sexes can easily be separated because the male has the large pair of fifth feet (pl. 30, figs. 81, 82).

Length: 6.2 mm.

Coloration: The intestinal contents are light yellow; light rose pigment occurs in the bristles of the feet, in the maxillipeds, and there is a fleck around the mouth.

Occurrence: Station 1252, tow at 310 f., sounding 345 f., July 11, 1906; station 1315, vertical from 320 f., sounding 330 f., July 19, 1906.

The fifth feet of the San Diego specimens show slight differences as compared with the figures of Giesbrecht (1892, pl. 29, fig. 9), but they are not sufficient to warrant a specific distinction.

Genus **Phyllopus** Brady.

Phyllopus integer n. sp.

Pl. 27, figs. 11, 13, 17; pl. 31, fig. 90; pl. 32, figs. 109, 110.

The sexes are alike in conformation of the head and thorax. The head is smoothly rounded in dorsal and side views (pl. 27, figs. 13, 17). The thorax is symmetrical and there is a bay or indentation in the dorsal margin of the last segment near the tip (pl. 27, fig. 11). The rostrum is short and heavy (pl. 27, fig. 17).

The cephalothorax is 4-segmented and the greatest width is contained two and one-sixth times in the length along the mid-dorsal line. The abdomen in the male is 5-segmented, and with the furca is less than half as long as the cephalothorax. The genital segment in the female is half the length of the abdomen, the other segments being of equal lengths. Each of the three middle segments in the male is longer than the genital segment; the middle segments are of equal lengths among themselves.

The anterior antennae reach back to the posterior border of the second segment of the cephalothorax. The other appendages do not show any specific differences except in the case of the fifth feet; their structure may be understood from pl. 32, figs. 109 and 110.

Length: Female, 3.54 mm.; male, 2.64 mm.

Coloration: Whitish and somewhat translucent in formalin.

Occurrence: Among other stations, station 1249, tow at, and vertical from, 325 f., sounding 370 f., July 11, 1906; station 1339, vertical from 310 f., sounding 330 f., July 21, 1906.

Wolfenden (1904, p. 124, pl. 9, fig. 16) was the first to describe the male of *Phyllopus,* but was in error in stating that

the right foot of the fifth pair is biramous. He referred his specimens to *P. bidentatus* Brady, but said that the females in his collections did not correspond with Brady's descriptions. Later Farran (1905, p. 45, pl. 11, figs. 12-21) also referred his specimens to *P. bidentatus* Brady, but afterwards (1908, p. 83) separated them into two new species. The San Diego specimens do not have the bidentation on the last thoracic segment, and, though I have assigned an animal from this locality to the species *bidentatus* (Esterly, 1905, p. 191), I now think that the males and females occurring in the same collections belong to this new species. The most evident specific differences are found in the fifth feet of the male as compared with *P. helgae* Farran (1905, p. 11, figs. 18, 19), and this author states that he first regarded the male of this species as that of *P. bidentatus.* The fifth feet in the female of *P. helgae* (Farran, 1908, pl. 11, figs. 20, 21) resemble those of *P. integer,* yet there are differences which I think may be regarded as specific.

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Los Angeles, California, May 15, 1910.

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EXPLANATION OF PLATES.

PLATE 26.

Fig. 1. *Augaptilus pyramidalis* n. sp. Female, dorsal. × 11.

Fig. 2. *Euchaeta solida* n. sp. Male, lateral. × 22.

Fig. 3. *Gaetanus secundus* n. sp. Female, lateral. × 22.

Fig. 4. *Undeuchaeta bispinosa* n. sp. Female, lateral. × 22.

Fig. 5. *Euchirella truncata* n. sp. Female, lateral. × 11.

Fig. 6. *Paraugaptilus buchani* Wolfenden. Female, lateral. × 35.

Fig. 7. *Augaptilus lucidus* n. sp. Male, dorsal. × 13.5.

Fig. 8. *Augaptilus lamellifer* n. sp. Female, lateral. × 22.

Fig. 9. *Augaptilus pyramidalis* n. sp. Female, lateral. × 22.

Fig. 10. *Euchirella simplex* n. sp. Female, lateral. × 11.

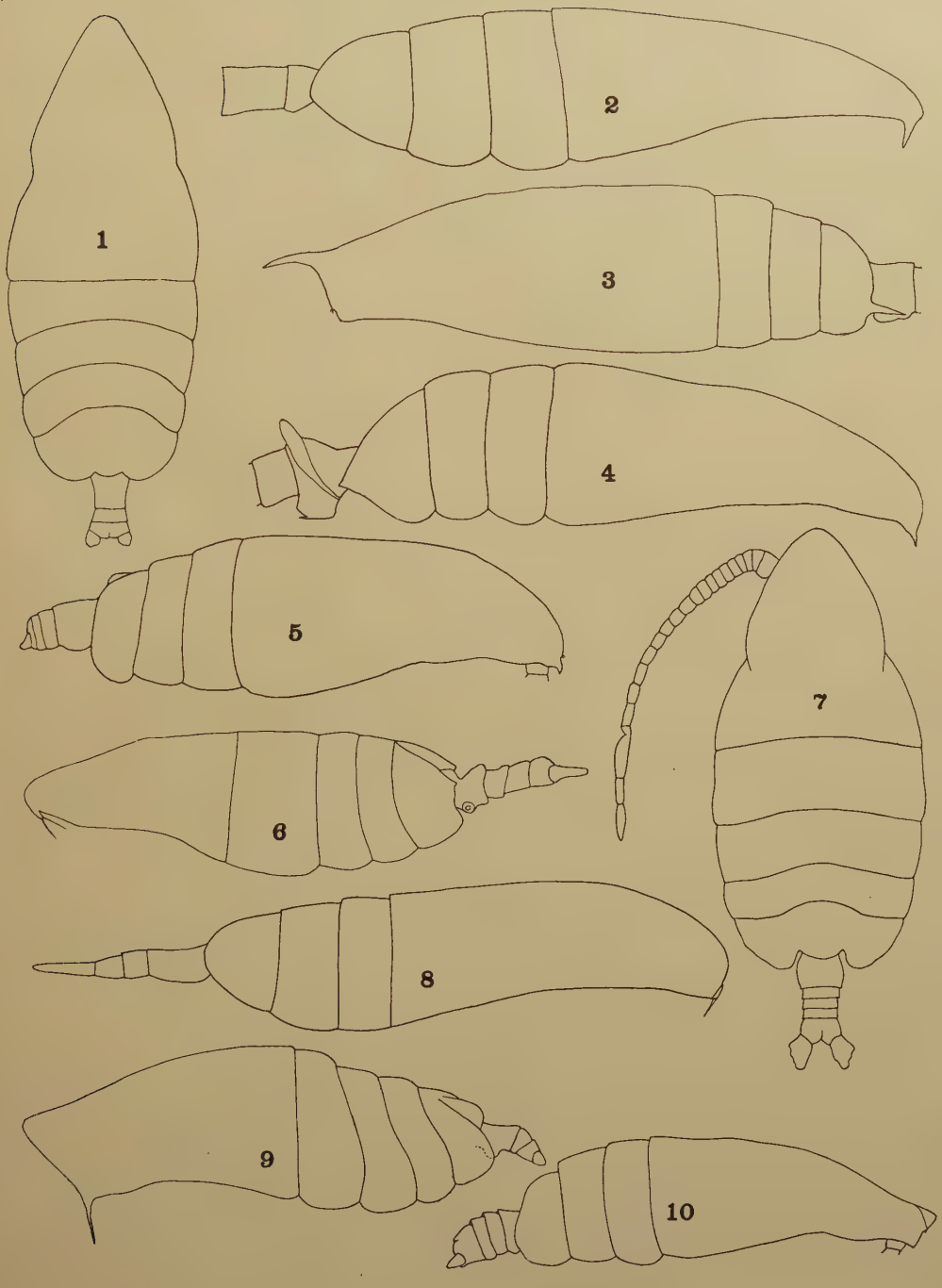
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PLATE 27.

Fig. 11. *Phyllopus integer* n. sp. Male, lateral. × 33.
Fig. 12. *Undeuchaeta incisa* n. sp. Female, lateral. × 16.5.
Fig. 13. *Phyllopus integer* n. sp. Male, dorsal. × 33.
Fig. 14. *Euchirella propria* n. sp. Male, lateral. × 16.5.
Fig. 15. *Scolecithrix vorax* n. sp. Female, head from side. × 105.
Fig. 16. *Augaptilus lucidus* n. sp. Male, head from side. × 16.5.
Fig. 17. *Phyllopus integer* n. sp. Male, head from side. × 105.
Fig. 18. *Augaptilus macrodus* n. sp. Female, lateral. × 16.5.
Fig. 19. *Undeuchaeta incisa* n. sp. Female, head from side. × 52.5
Fig. 20. *Euchirella propria* n. sp. Male, head from side. × 52.5.
Fig. 21. *Scolecithrix vorax* n. sp. Female, lateral. × 52.5.
Fig. 22. *Arietellus setosus* Giesbrecht. Male, head from side. × 105.
Fig. 23. *Arietellus setosus* Giesbrecht. Male, lateral. × 16.5.

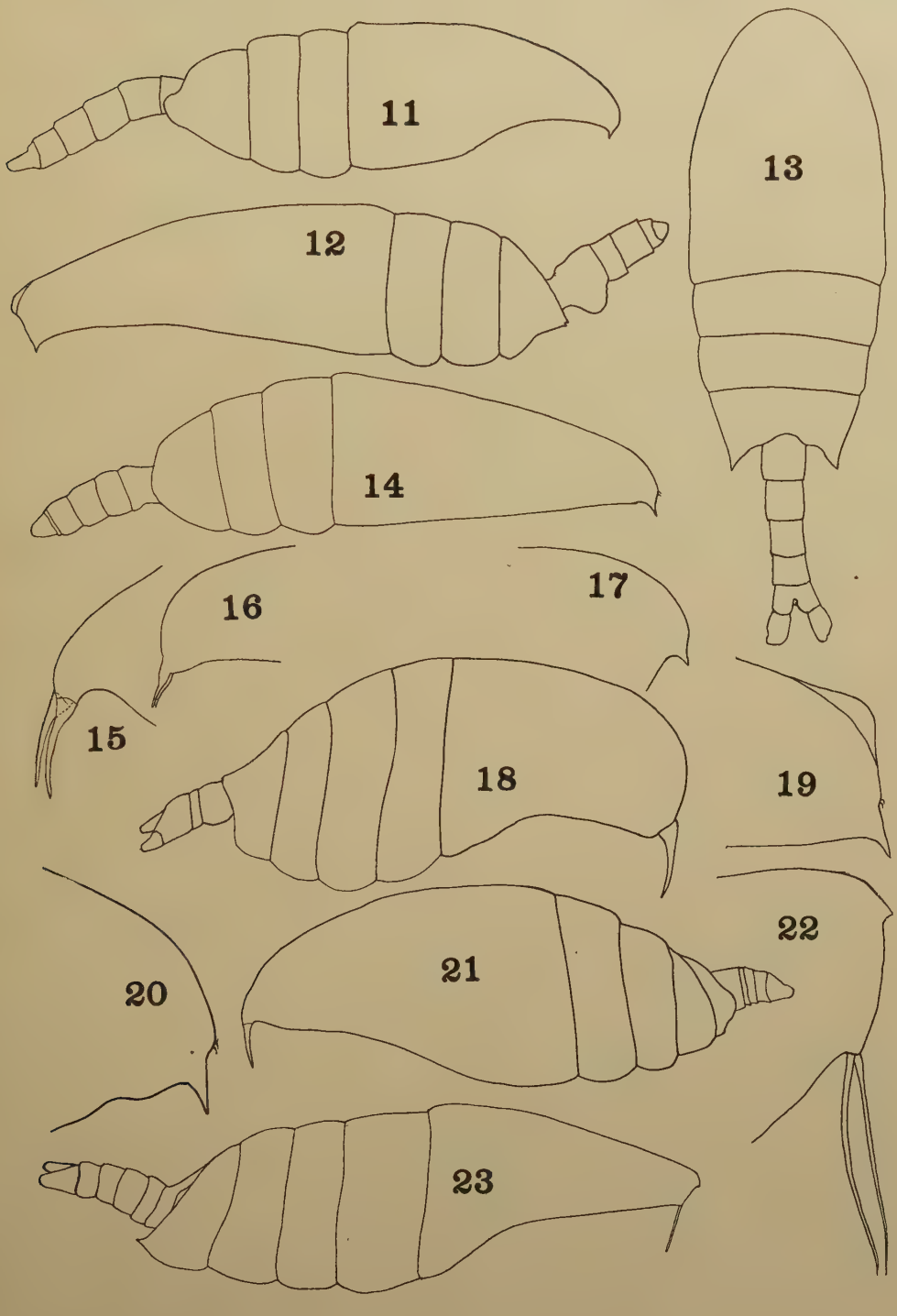
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PLATE 28.

Fig. 24. *Aetideopsis pacifica* n. sp. Female, lateral. × 29.

Fig. 25. *Aetideopsis pacifica* n. sp. Female, head from side. × 93.

Fig. 26. *Gaidius tenuispinus* Sars. Male, head from side. × 47.

Fig. 27. *Aetideopsis divaricata* n. sp. Female, lateral. × 29.

Fig. 28. *Undeuchaeta incisa* n. sp. Female, part of last thoracic segment, and genital segment from left side. × 47.

Fig. 29. *Aetideopsis divaricata* n. sp. Female, head from side. × 96.

Fig. 30. *Aetideopsis pacifica* n. sp. Female, rostrum from below. × 47.

Fig. 31. *Aetideopsis divaricata* n. sp. Female, fourth and fifth thoracic segments and abdomen, dorsal. × 96.

Fig. 32. *Aetideopsis divaricata* n. sp. Female, rostrum from below. × 47.

Fig. 33. *Xanthocalanus tectus* n. sp. Female, head from side. × 47.

Fig. 34. *Euchaeta solida* n. sp. Male, head from side. × 93.

Fig. 35. *Euchirella truncata* n. sp. Female, head from side. × 93.

Fig. 36. *Augaptilus lamellifer* n. sp. Female, head from side. × 47.

Fig. 37. *Euchaeta diegensis* n. sp. Female, head from side. × 96.

Fig. 38. *Gaetanus secundus* n. sp. Female, abdomen and part of last thoracic segment, lateral. × 47.

Fig. 39. *Paraugaptilus buchani* Wolfenden. Female, head from side. × 47.

Fig. 40. *Disseta* sp. (Wolfenden). Male, lateral. × 15.

Fig. 41. *Disseta* sp. (Wolfenden). Male, head from side. × 93.

Fig. 42. *Scolecithrix angusta* n. sp. Female, head from side. × 47.

Fig. 43. *Gaetanus secundus* n. sp. Female, head from side. × 96.

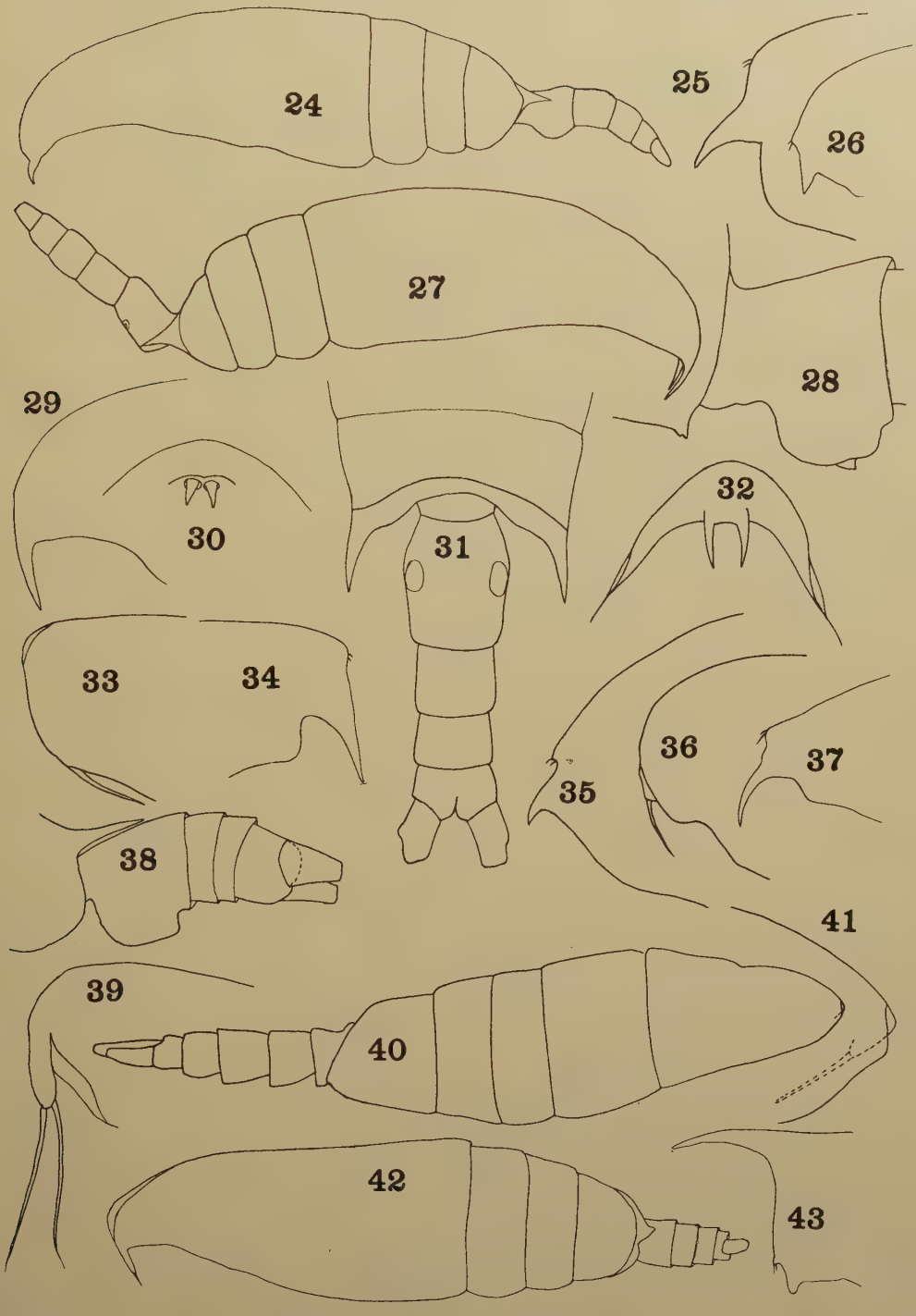
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PLATE 29.

Fig. 44. *Augaptilus macrodus* n. sp. Female, abdomen and last thoracic segment, lateral. × 11.

Fig. 45. *Scolecithrix vorax* n. sp. Female, last two thoracic segments and abdomen, lateral. × 70.

Fig. 46. *Scolecithrix angusta* n. sp. Female, parts of last two thoracic segments and abdomen, lateral. × 70.

Fig. 47. *Onchocalanus latus* n. sp. Female, head and two thoracic segments, dorsal. × 72.5.

Fig. 48. *Undeuchaeta bispinosa* n. sp. Female, genital segment and part of last thoracic, lateral. × 40.

Fig. 49. *Euchaeta diegensis* n. sp. Female, genital segment and part of last thoracic, lateral. × 72.5.

Fig. 50. *Euchirella simplex* n. sp. Female, head from side. × 35.

Fig. 51. *Scolecithrix angusta* n. sp. Female, head from side. × 70.

Fig. 52. *Euchirella rostrata* Claus. Male, head from side. × 72.5.

Fig. 53. *Xanthocalanus tectus* n. sp. Female, abdomen and last thoracic segments, lateral. × 35.

Fig. 54. *Disseta maxima* n. sp. Female, head from side. × 40.

Fig. 55. *Euchaeta diegensis* n. sp. Female, genital segment from below. × 72.5.

Fig. 56. *Undeuchaeta bispinosa* n. sp. Female, genital segment, ventral. × 72.5.

Fig. 57. *Paraugaptilus buchani* Wolfenden. Female, rostrum from below. × 70.

Fig. 58. *Disseta maxima* n. sp. Female, abdomen and part of thorax from side. × 13.5.

Fig. 59. *Undeuchaeta incisa* n. sp. Female, genital segment and part of thorax from below. × 35.

Fig. 60. *Xanthocalanus pulcher* n. sp. Female, abdomen and last thoracic segment from side. ×72.5.

Fig. 61. *Xanthocalanus pulcher* n. sp. Female, head from side. × 72.5.

Fig. 62. *Euchirella simplex* n. sp. Female, abdomen and part of thorax from below. × 70.

Fig. 63. *Euchirella truncata* n. sp. Female, abdomen and part of thorax from side. × 70.

Fig. 64. *Gaidius tenuispinus* Sars. Male, abdomen and last thoracic segment from side. × 35.

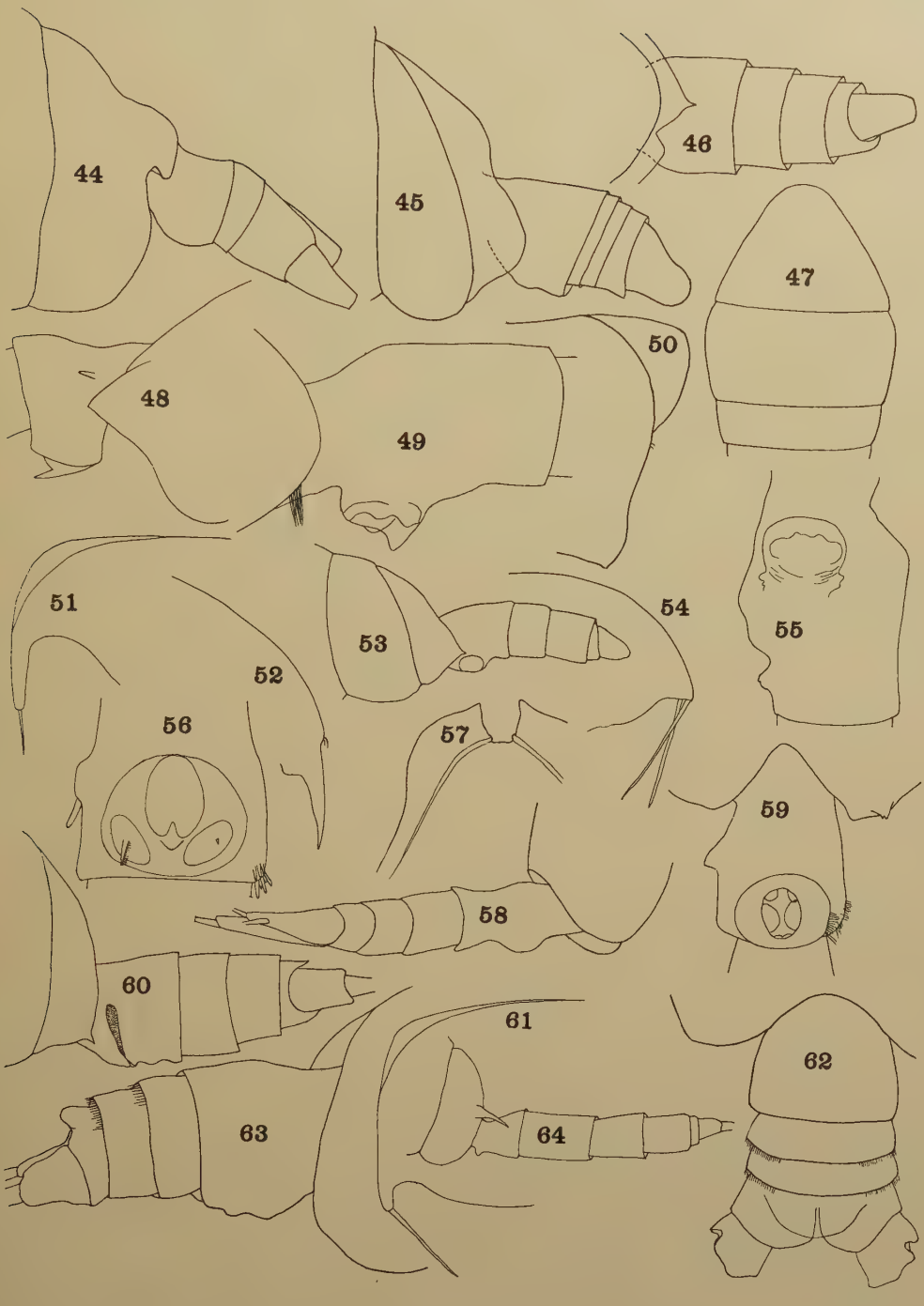
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PLATE 30.

Fig. 65. *Pleuromamma quadrungulata* Dahl. Female, first four joints of right anterior antenna. × 40.

Fig. 66. *Euchirella rostrata* Claus. Male, tip of left fifth foot. × 190.

Fig. 67. *Euchirella propria* n. sp. Male, tip of left fifth foot. × 215.

Fig. 68. *Scolecithrix vorax* n. sp. Female, sensory appendages on the anterior maxilliped. × 215.

Fig. 69. *Augaptilus pyramidalis* n. sp. Female, outer ramus of first foot. × 70.

Fig. 70. *Onchocalanus latus* n. sp. Female, part of the anterior maxilliped showing the sensory appendages. × 190.

Fig. 71. *Euchirella truncata* n. sp. Female, first basal of fourth foot showing the spine. × 35.

Fig. 72. *Augaptilus macrodus* n. sp. Female, posterior antenna. × 35. The inner ramus is at the left of the figure.

Fig. 73. *Gaetanus secundus* n. sp. Female, first basal of the fourth foot showing the row of spines. × 35.

Fig. 74. *Augaptilus macrodus* n. sp. Female, blade of mandible. × 70.

Fig. 75. *Augaptilus lucidus* n. sp. Male, blade of mandible. × 70.

Fig. 76. *Disseta* sp. (Wolfenden). Male, blade of mandible. × 70.

Fig. 77. *Augaptilus lucidus* n. sp. Male, posterior antenna. × 35. The inner ramus is at the right of the figure.

Fig. 78. *Euchaeta solida* n. sp. Male, toothed process on the second joint of the outer ramus of the left fifth foot. × 215.

Fig. 79. *Disseta maxima* n. sp. Female, fifth foot. × 40.

Fig. 80. *Disseta* sp. (Wolfenden). Male, outer ramus of the first foot. × 70.

Figs. 81 and 82. *Arietellus setosus* Giesbrecht. Male, fifth feet. × 35.

Fig. 83. *Euchirella propria* n. sp. Male, fifth feet exclusive of basals. × 35.

Fig. 84. *Gaetanus secundus* n. sp. Female, first basal of posterior maxilliped to show the lamella. × 70.

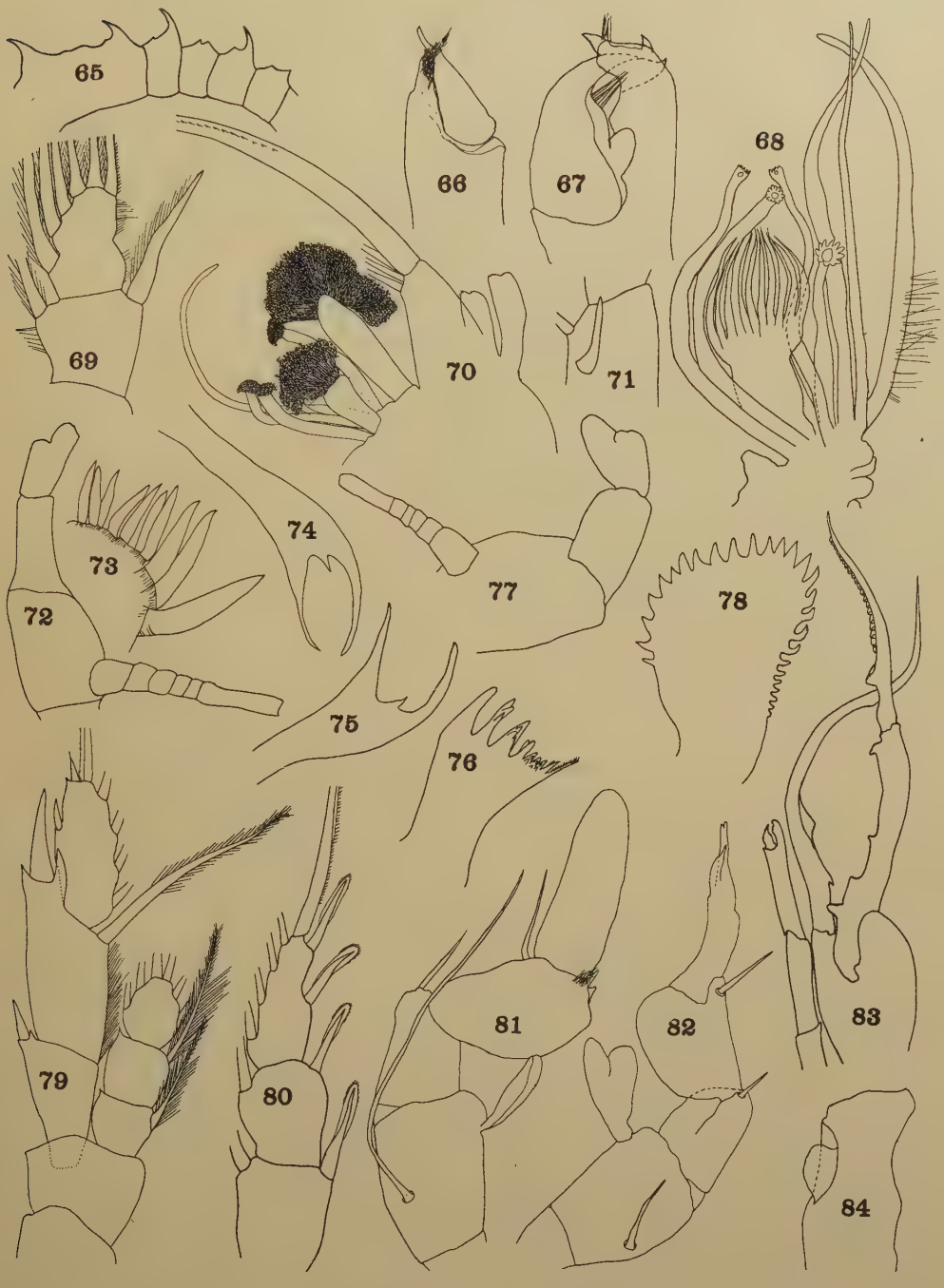
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PLATE 31.

Fig. 85. *Euchirella propria* n. sp. Male, first foot. × 93.

Fig. 86. *Aetideopsis pacifica* n. sp. Female, first foot. × 93.

Fig. 87. *Augaptilus macrodus* n. sp. Female, first foot. × 47.

Fig. 88. *Aetideopsis divaricata* n. sp. Female, first foot. × 93.

Fig. 89. *Euchirella simplex* n. sp. Female, first foot. × 47.

Fig. 90. *Phyllopus integer* n. sp. Male, first foot. × 93.

Fig. 91. *Xanthocalanus pulcher* n. sp. Female, fifth foot. × 93.

Fig. 92. *Euchaeta diegensis* n. sp. Female, part of outer ramus of second foot. × 95.

Fig. 93. *Scolecithrix vorax* n. sp. Female, second foot. × 93.

Fig. 94. *Paraugaptilus buchani* Wolfenden. Female, fifth foot. × 93.

Fig. 95. *Xanthocalanus tectus* n. sp. Female, fifth foot. × 245.

Fig. 96. *Scolecithrix vorax* n. sp. Female, fifth foot. × 287.

Fig. 97. *Onchocalanus latus* n. sp. Female, inner ramus of fourth foot. × 95.

Fig. 98. *Paraugaptilus buchani* Wolfenden. Female, the two end joints of the anterior antenna. × 93.

Fig. 99. *Scolecithrix vorax* n. sp. Female, a part of the terminal bristle of the outer ramus of the second foot. × 287.

Fig. 100. *Disseta* sp. (Wolfenden). Male, distal half of the second outer marginal bristle of the outer ramus of the first foot. × 553.

Fig. 101. *Scolecithrix angusta* n. sp. Female, fifth foot. × 287.

Figs. 102 and 103. *Aetideopsis divaricata* and *A. pacifica* n. sps. Female, basal part of the serrate margin of the terminal bristle of the outer ramus of the fourth foot. × 553.

Fig. 104. *Euchirella truncata* n. sp. Female, first foot. × 47.

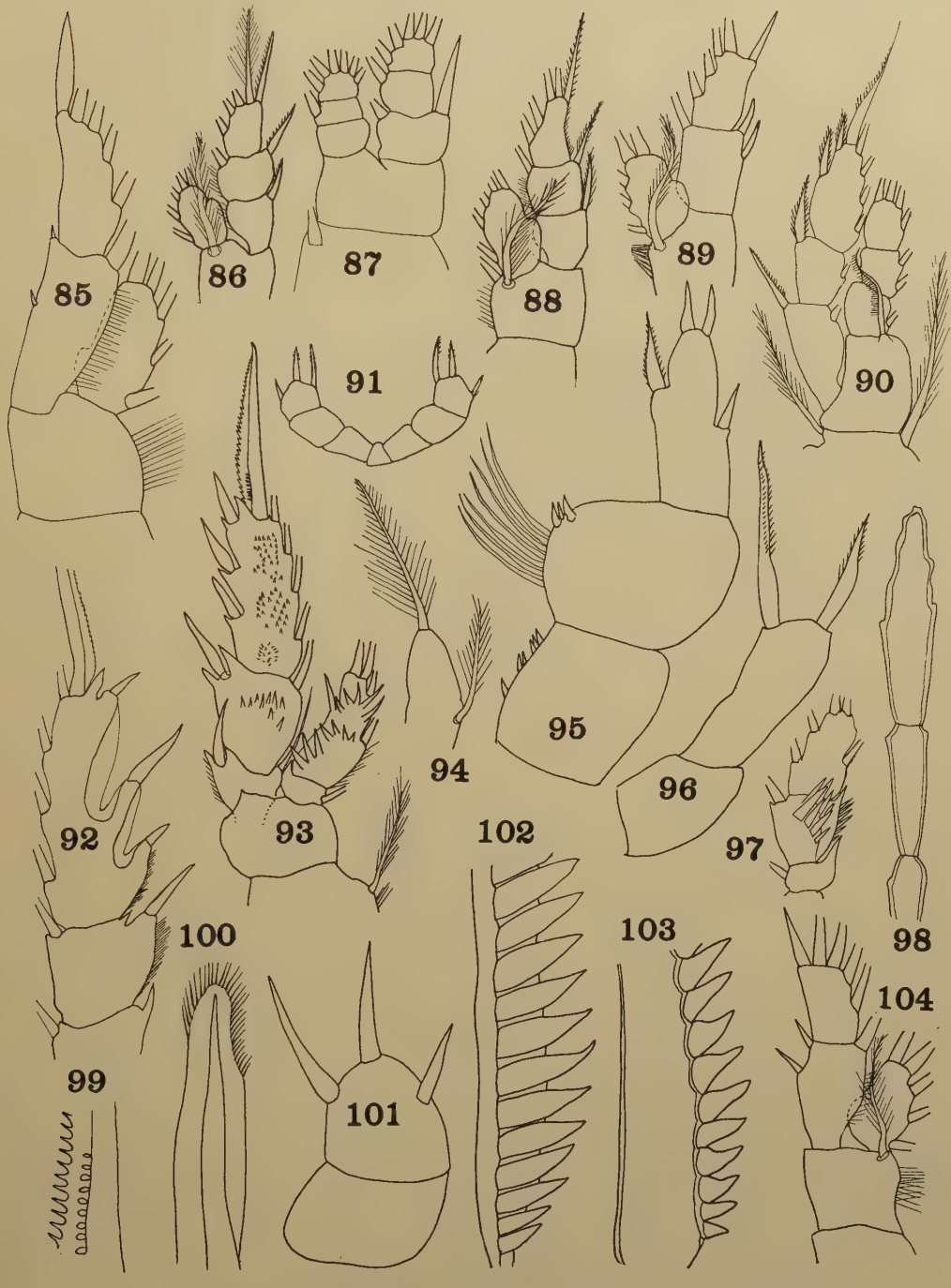
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PLATE 32.

Fig. 105. *Augaptilus lucidus* n. sp. Male, fifth pair of feet. × 47.

Fig. 106. *Augaptilus pyramidalis* n. sp. Female, outer ramus of fifth foot. × 93.

Figs. 107 and 108. *Disseta* sp. (Wolfenden). Male, right and left fifth foot respectively. × 47.

Fig. 109. *Phyllopus integer* n. sp. Male, fifth pair of feet. × 47. The left foot is at the right.

Fig. 110. *Phyllopus integer* n. sp. Female, three distal joints of the fifth foot. × 287.

Fig. 111. *Pleuromamma quadrungulata* Dahl. Male, fifth feet. × 93.

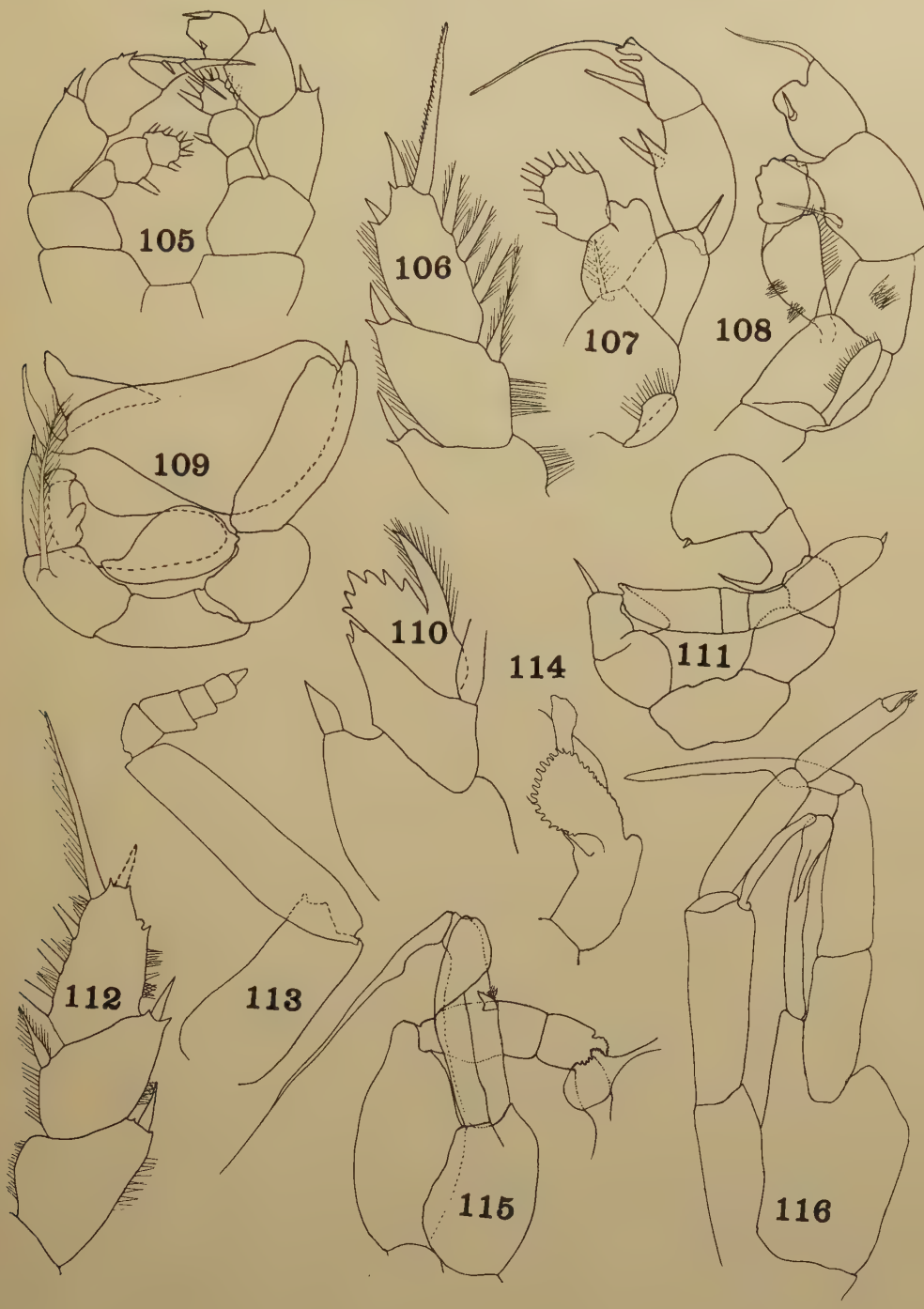
Fig. 112. *Augaptilus macrodus* n. sp. Female, outer ramus of fifth foot. × 93.

Fig. 113. *Aetideopsis pacifica* n. sp. Female, posterior maxilliped. × 93.

Fig. 114. *Euchaeta solida* n. sp. Male, part of outer ramus of left fifth foot. × 93.

Fig. 115. *Euchaeta acuta* var. *pacifica* n. var. Male, fifth pair of feet. × 53. The left foot is at the left.

Fig. 116. *Euchirella rostrata* Claus. Male, fifth pair of feet. × 95. The left foot is at the left.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